

for blue

# Work Order ID 62629

Tuesday, October 05, 2010 1:00:58 PM



Page 1

Item ID: D206-667-103TRN

Accept



Setup Start



Revision ID:

Item Name: Crosstube Turning DetailL

Stop



Start Date: 10/5/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 10/19/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan:

H

Date: 10/10/05 Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

Draw Nbr	Revision Nbr
D206-667-143	Rev C

100



MORI SEIKI CNC LATHE LARGE

0.00

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs DT8534 on both ends as per Folio FA087  
2-Turn first side as per Folio FA087  
3-File down transition lines smooth.

B.A /10/10/14

1

110



QC1- Inspect dimensions to dimension sheet

0.00

QC

Memo

0.00

Quality Control

B.A /10/10/14

1

120



MORI SEIKI CNC LATHE LARGE

0.00

Mori Seiki

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA087  
2-File down transition lines smooth.  
3-Remove sand and plugs

S.A /10/10/20

1

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D206-667-103TRN PAR #: N/A Fault Category: Glass tube. NCR: Yes No DQA: LH Date: 10/10/26  
 Resolution: Accepted Disposition: Use-as-is QA: N/C Closed: LH Date: 10/10/26

WORK ORDER NON-CONFORMANCE (NCR)								
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
10/10/21	120	(1) under tolerance at one section of tube.	JP 10/10/21 Q81042	Acceptable. RER ATTACHED SR	B.A 10/10/21	S 10/10/21	JP 10/10/21 Q81042	S 10/10/21
		RC: Process						

NOTE: Date & initial all entries

**Work Order ID 62629**

Tuesday, October 05, 2010 1:00:58 PM



Page 2

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Stop



Start Date: 10/5/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 10/19/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

130



QC

Quality Control

QC1- Inspect dimensions to dimension sheet

0.00

10/10/20

0.00

140



QC

Quality Control

QC8- Inspect parts - second check

0.00

S 10/10/25

0.00

150



HandFXtube

Hand Finishing Crosstubes

Crosstubes Chemical Conversion

0.00

SAD  
10-10-25

0.00

(1)

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
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Page 3

Tuesday, October 05, 2010 1:00:58 PM

Item ID: D206-667-103TRN

Accept



Setup Start



Revision ID:

Item Name: Crosstube Turning DetailL

Stop



Start Date: 10/5/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 10/19/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals:

Process Plan:

Date:

Tooling:

Date:

Run Start



QC:

Date:

SPC (Y/N):

Date:

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

160

QC3- Inspect Part Finish

0.00



QC

Quality Control

170

Packaging

0.00

Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack  Location:

180

QC21- Final Inspection - Work Order Release

0.00

QC

Quality Control

Memo

0.00

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
		)						

NOTE: Date & initial all entries

# Picklist Print

Page 1

Tuesday, October 05, 2010 1:01:02 PM

Work Order ID: 62629



Parent Item: D206-667-103TRN



Parent Item Name: Crosstube Turning DetailL

Start Date: 10/5/2010

Required Date: 10/19/2010

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:A 08-03-06 new issue DD verified by:ec  
IPP Rev B 08.04.02 removed polish EC verified by DD

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D6002-115		Manufactured	No			110	Each	50.0000	1	1		SA 10/10/20	

Crosstube Material

Location	Loc Qty	Loc Code
LG	50	
34684	1	
34776	49	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	Co2629
Description: Crosstube Assembly (206L High Fwd)	Part Number:	D206-667-143
Inspection Dwg: D206-667-143 Rev: C		Page 1 of 1

### FIRST ARTICLE INSPECTION CHECKLIST

Inspection Sheet Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.245	✓		
	1.982	+0.005/-0.000	1.982	✓		
	2.019	+0.005/-0.000	2.019	✓		
	2.058	+0.005/-0.000	2.058	✓		
	2.097	+0.005/-0.000	2.097	✓		
	2.136	+0.005/-0.000	2.133	/		
	2.176	+0.005/-0.000	2.172	/		
	2.201	+0.005/-0.000	2.196	/		
	0.125	+/-0.010	0.128	✓		
	0.400 x 30°	+/-0.010	0.400x30°	✓		
	R0.063	+/-0.010	R0.063	✓		
	R0.500	+/-0.010	R0.500	✓		
	4.438	+/-0.030	4.442	✓		
	104.98	+/-0.020	105.00	/		
	2.240	+0.005/-0.000	2.245	/		
SIDE B	1.982	+0.005/-0.000	1.982	/		
	2.019	+0.005/-0.000	2.023	/		
	2.058	+0.005/-0.000	2.062	/		
	2.097	+0.005/-0.000	2.101	/		
	2.136	+0.005/-0.000	2.138	/		
	2.176	+0.005/-0.000	2.171	/		
	2.201	+0.005/-0.000	2.204	/		
	0.125	+/-0.010	.12F	/		
	0.400 x 30°	+/-0.010	.400x30°	/		
	R0.063	+/-0.010	R0.063	/		
	R0.500	+/-0.010	R0.500	/		
	4.438	+/-0.030	4.442	/		

Measured by:	J.A	Audited by:	J	Preliminary Approval:	N/A
Date:	10/10/14	Date:	10/10/14	Date:	N/A

Rev	Date	Change	Revised by	Approved
A	04.05.06	New Issue (P/O D206-667-103)	KJ/RF	
B	06.03.09	Dwg Rev updated	KJ/JLM	
C	10.09.13	Dwg Rev updated	KJ	M

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

8 7 6 5 4 3 2 1

D

Item	Qty	Part Number	Description
	-143		
1	X	D206-667-143	CROSSTUBE ASSEMBLY (206L HIGH FWD)
2	1	D6002-115	CROSSTUBE
3	2	D2873-043	NUT PLATE
4	2	D2873-045	NUT PLATE
5	2	D2891-1	SUPPORT
6	4	D3595-063-395	RUBBER CUSHION
7	4	MS21920-20	CLAMP (OR MS21920-21)
8	14	MS20601AD4W8	RIVET (OR NAS9302B-4-8)
9	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

**GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6002-115  
FINISHED LENGTH =  $104.98 \pm 0.020$
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D206-667-143" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 15.5 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT EDGE LONGITUDINALLY.  
TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 10 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2891-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-20 CLAMPS (OR -21) WITH D3595-063-395 RUBBER CUSHIONS TO SECURE THE D2891-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMP MECHANISMS ARE LOCATED ON CROSSTUBE SUPPORTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETUR...  
ENGINEER...  
UNCONTRO...  
SUBJECT TO...  
VIEW...  
WORK...  
NO. *Collegia*  
*Bf10-10-05*

RELEASED  
*08/11/11*

C	REVISE GENERAL NOTES/PART LIST (ZN D7-1); REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS. D3595-063-395 WAS D2856-400-694 (ZN D6-2 & A5-2); REMOVED REF. & ADD TOLERANCE (ZN D3-3, C4-3, C5-3); RELOCATED FLAG #6 (ZN A8-3) PER NCR 210; MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4.	RF	08.11.06
B	ADD HOLES AND NUT PLATES FOR COMPATABILITY WITH BHT/AA SKUDTUBES	PH	05.07.26
A	NEW ISSUE	CP	00.11.17
REV.	DESCRIPTION	BY	DATE
DESIGN	<i>Q</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	<i>Q</i>	DRAWING NO.	REV. C
MFG. APPR.	<i>Q</i>	D206-667-143	SHEET 1 OF 4
APPROVED	<i>Q</i>	TITLE	SCALE
DE APPR.	<i>Q</i>	CROSSTUBE ASSY (206L HIGH FWD)	NTS
DATE	08.11.06	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUBJECT TO RESTRICTIONS ON ITS DISSEMINATION. IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD	

8 7 6 5 4 3 2 1

D

C

B

A

1

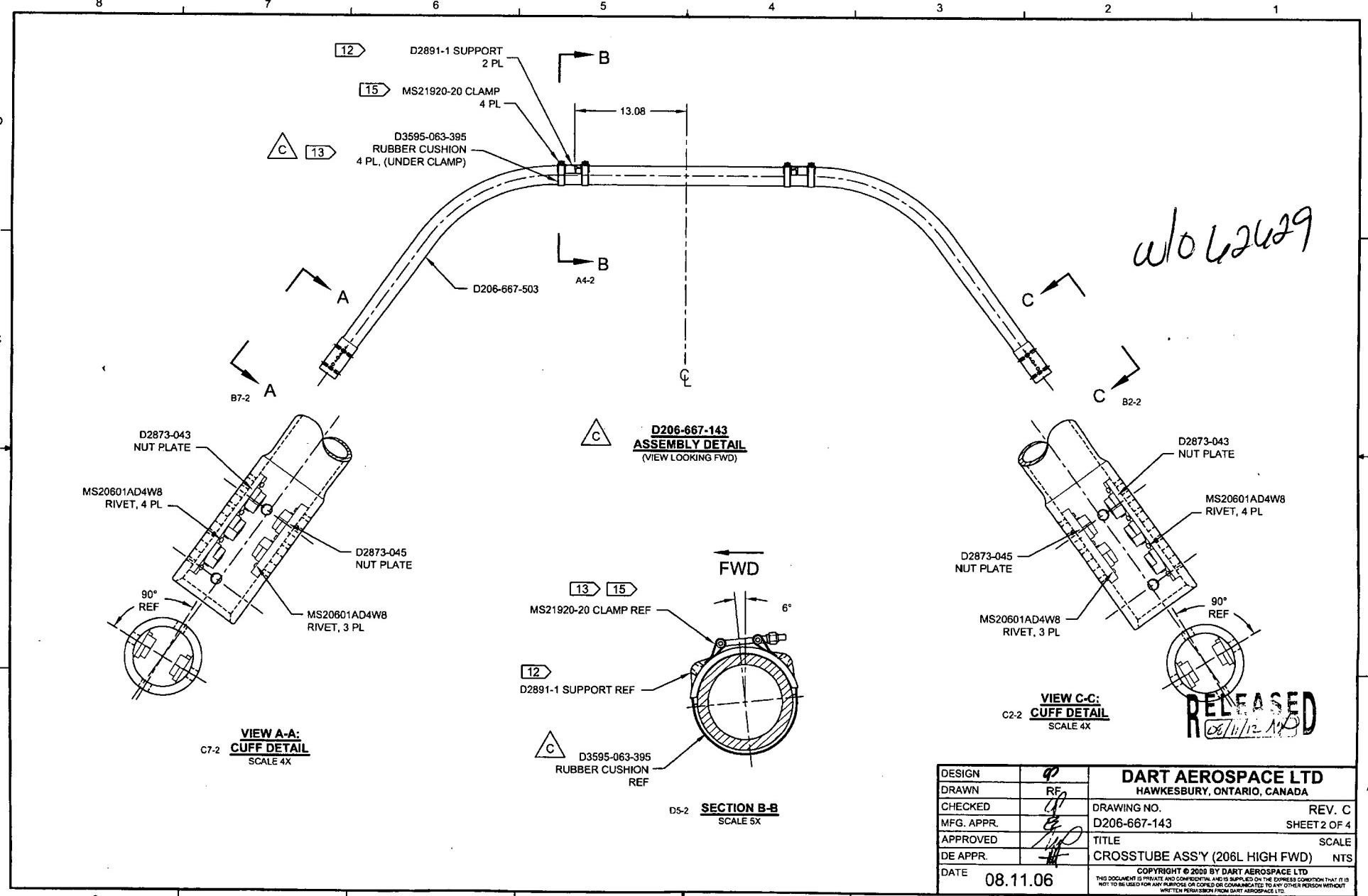
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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NOTE: Date & initial all entries



DESIGN	<i>[Signature]</i>	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA		
DRAWN	RF			
CHECKED	<i>[Signature]</i>	DRAWING NO.	REV. C	
MFG. APPR.	<i>[Signature]</i>	D206-667-143	SHEET 2 OF 4	
APPROVED	<i>[Signature]</i>	TITLE	SCALE	
DE APPR.	<i>[Signature]</i>	CROSSTUBE ASS'Y (206L HIGH FWD)	NTS	
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W/O:		WORK ORDER CHANGES					
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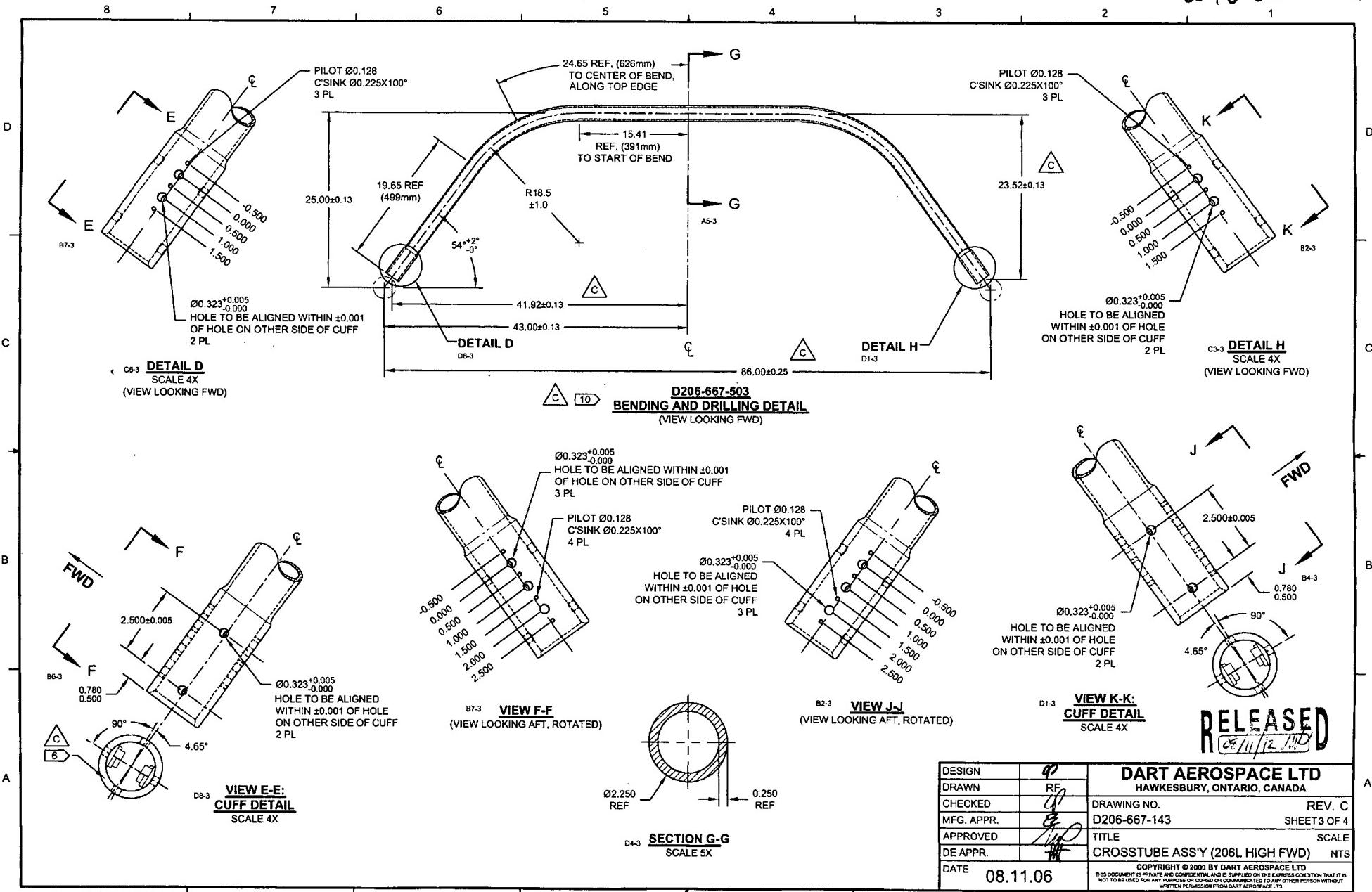
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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w16 42629



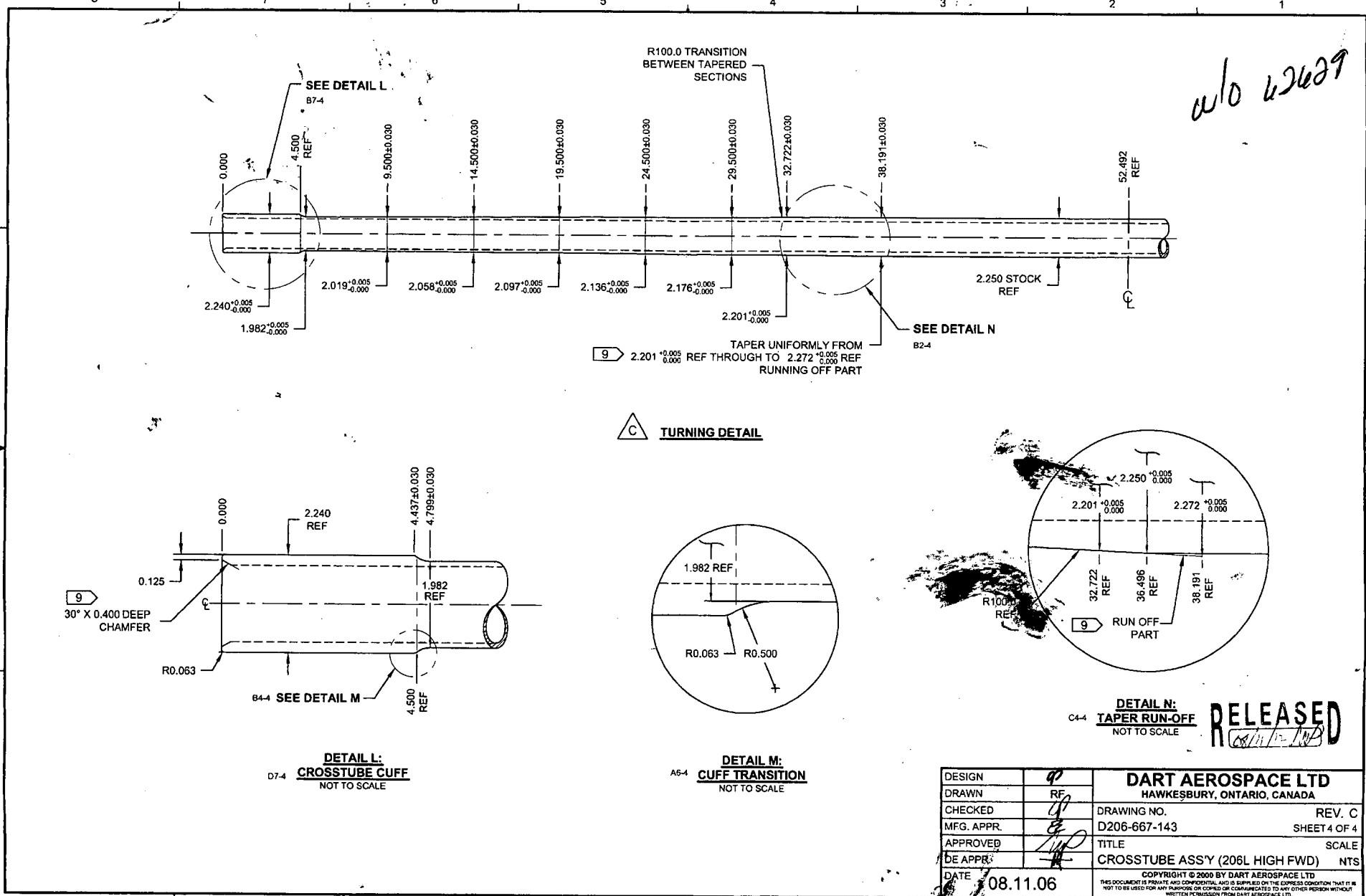
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Extract from SR-D206-667-2

SECTION	Cross tube	Damage Tolerance	O.D. (in)	I.D. (in)	Area (in <sup>2</sup> )	Inertia (in <sup>4</sup> )
A-A	Bell Fwd	0.000	2.250	1.750	1.571	0.798
	Bell Fwd w/ dam. tol.	0.005			1.566	0.791
	Dart Fwd	0.000	2.250	1.750	1.571	0.798
	Dart Fwd w/ dam. tol.	0.015			1.495	0.751
B-B	Bell Fwd	0.000	2.207	1.750	1.420	0.704
	Bell Fwd w/ dam. tol.	0.005			1.415	0.698
	Dart Fwd	0.000	2.196	1.750	1.382	0.681
	Dart Fwd w/ dam. tol.	0.015			1.306	0.636
C-C	Bell Fwd	0.000	2.173	1.750	1.303	0.634
	Bell Fwd w/ dam. tol.	0.005			1.298	0.628
	Dart Fwd	0.000	2.163	1.750	1.269	0.614
	Dart Fwd w/ dam. tol.	0.015			1.193	0.569
D-D	Bell Fwd	0.000	2.139	1.750	1.188	0.567
	Bell Fwd w/ dam. tol.	0.005			1.183	0.561
	Dart Fwd	0.000	2.130	1.750	1.158	0.550
	Dart Fwd w/ dam. tol.	0.015			1.082	0.505
E-E	Bell Fwd	0.000	2.105	1.750	1.075	0.503
	Bell Fwd w/ dam. tol.	0.005			1.070	0.498
	Dart Fwd	0.000	2.099	1.750	1.055	0.492
	Dart Fwd w/ dam. tol.	0.015			0.979	0.448
F-F	Bell Fwd	0.000	2.045	1.750	0.879	0.398
	Bell Fwd w/ dam. tol.	0.005			0.874	0.393
	Dart Fwd	0.000	2.039	1.750	0.860	0.388
	Dart Fwd w/ dam. tol.	0.012			0.787	0.348
G-G	Bell Fwd	0.000	1.986	1.750	0.692	0.303
	Bell Fwd w/ dam. tol.	0.005			0.687	0.298
	Dart Fwd	0.000	1.980	1.750	0.674	0.294
	Dart Fwd w/ dam. tol.	0.012			0.601	0.255
H-H	Bell Fwd	0.000	2.250	1.750	1.571	0.798
	Bell Fwd w/ dam. tol.	0.005			1.566	0.791
	Dart Fwd	0.000	2.240	1.750	1.536	0.775
	Dart Fwd w/ dam. tol.	0.030			1.445	0.710

SECTION	Cross tube	Bending Ultimate (lb*in)	Bending Yield (lb*in)	Tension Ultimate (lb)	Tension Yield (lb)	Shear Ultimate (lb)
A-A	Bell fwd w/ DT	46425	39391	103343	87685	65763
	Dart fwd w/ DT	51426	44375	115113	98668	61294
	Margin of Safety	0.11	0.13	0.11	0.13	-0.07
B-B	Bell fwd w/ DT	41755	35429	93408	79255	59442
	Dart fwd w/ DT	44567	38463	100593	86223	53563
	Margin of Safety	0.07	0.09	0.08	0.09	-0.10
C-C	Bell fwd w/ DT	38160	32378	85689	72705	54529
	Dart fwd w/ DT	40509	34964	91894	78766	48931
	Margin of Safety	0.06	0.08	0.07	0.08	-0.10
D-D	Bell fwd w/ DT	34649	29399	78089	66257	49693
	Dart fwd w/ DT	36541	31543	83327	71423	44369
	Margin of Safety	0.05	0.07	0.07	0.08	-0.11
E-E	Bell fwd w/ DT	31219	26489	70609	59911	44933
	Dart fwd w/ DT	32895	28398	75398	64627	40147
	Margin of Safety	0.05	0.07	0.07	0.08	-0.11
F-F	Bell fwd w/ DT	25360	21518	57702	48959	36719
	Dart fwd w/ DT	26286	22664	60614	51955	32275
	Margin of Safety	0.04	0.05	0.05	0.06	-0.12
G-G	Bell fwd w/ DT	19828	16824	45374	38499	28874
	Dart fwd w/ DT	19812	17085	46274	39664	24640
	Margin of Safety	-0.001	0.02	0.02	0.03	-0.15
H-H	Bell fwd w/ DT	46425	39391	103343	87685	65763
	Dart fwd w/ DT	48829	42421	111242	95350	59233
	Margin of Safety	0.05	0.08	0.08	0.09	-0.10

BIN 62629

MARGINS POSITIVE

OK CP 10.10.22

BIN 62632

MARGIN NEGATIVE

① SECTION G-G (ABOVE CUFF)  
HOWEVER BENDING MOMENT  
IS NEGLIGIBLE AT THIS  
LOCATION, IE. TUBE WILL  
FAIL IN BENDING NEAR  
UPPER SUPPORTS BEFORE THIS  
AREA, IE. NOT CRITICAL SECTION

CP 10.10.22